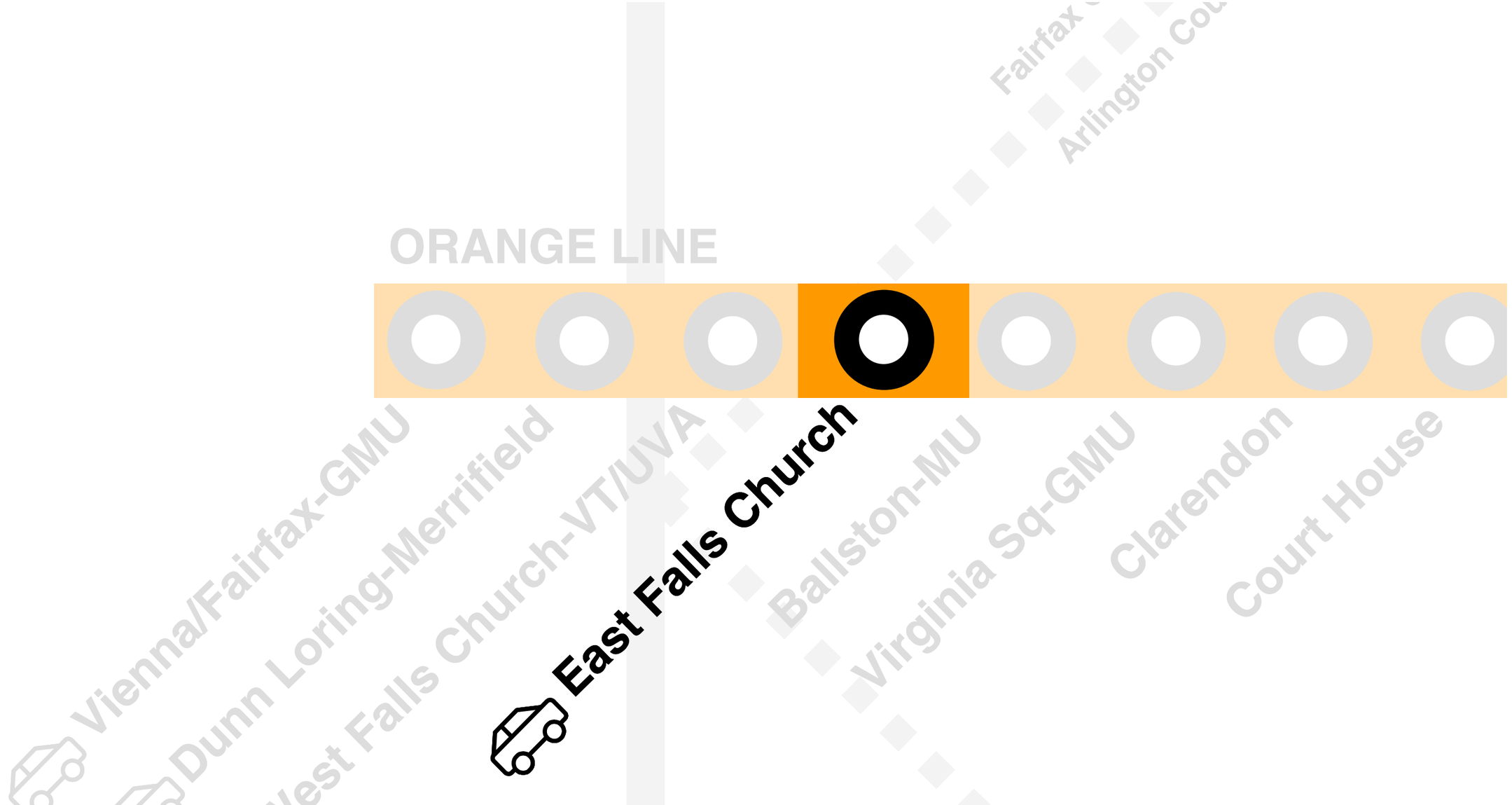
EAST FALLS CHURCH METRORAIL STATION ACCESS STUDY



Prepared for Arlington County, Virginia
by
Washington Metropolitan Area Transit Authority
Department of Capital Projects Management
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EAST FALLS CHURCH METRORAIL STATION ACCESS STUDY

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Note: This report has been prepared to demonstrate the feasibility of the concept presented. The concept is subject to further refinement and may be revised during future planning and/or engineering design phases of the project. The environmental planning process may include one or more of these alternatives along with others prior to any decision regarding implementation of a specific plan, which will be subject to professional engineering design principles.

EAST FALLS CHURCH METRORAIL STATION ACCESS STUDY

Introduction

The East Falls Church Metrorail station is located in western Arlington County, Virginia and serves the surrounding neighborhoods of mostly low-density residential land use. Despite the station's name, it is not located in the City of Falls Church, but rather in Arlington County. The station serves Orange Line trains on the Metrorail system operated by the Washington Metropolitan Area Transit Authority (WMATA). Figure 1 is an aerial photograph of the station area.

This Metrorail Station Access Study was conducted for WMATA and Arlington County, with two goals:

- Identify and evaluate potential access improvements to the station, to generally maximize the attractiveness of Metrorail as a service to the western portion of Arlington County.
- Evaluate the traffic impacts of possible development in the vicinity of the station.

Coincident with this study, the area's Neighborhood Conservation Plan is in the process of being updated. Information from this study is also intended to help guide decisions about updates to the Conservation Plan.

Figure 1: Aerial photograph of East Falls Church Metrorail Station and vicinity

Existing Conditions

Transportation Facilities

The Metrorail Orange Line runs in the median of Interstate 66 as it passes through the East Falls Church station. Interstate 66 is a primary east-west transportation corridor for the area, although unlike most freeways on the Interstate system, I-66 is closed to truck traffic. The freeway's high-occupancy vehicle (HOV) restrictions are also uncommon. During the morning peak, eastbound travel lanes (toward downtown Washington) are restricted to exclusively HOV traffic. Likewise, during the afternoon peak, westbound lanes (away from downtown Washington) are restricted to exclusively HOVs.

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Sycamore Street is a north-south arterial street that passes under I-66 and beneath the East Falls Church station platform. Sycamore has two lanes in each direction and includes a half-diamond interchange (to the east) with I-66. South of the station area, Sycamore Street's name changes to Roosevelt Street.

Washington Boulevard is an east-west arterial street that intersects Sycamore Street just north of the Metrorail station. Washington has two lanes in each direction west of Sycamore, but narrows to one lane in each direction east of Sycamore. In this eastern portion, Washington takes on the character of a collector street as it passes through residential neighborhoods.

West of Sycamore, eastbound and westbound Washington split. Westbound traffic stays on the north side of I-66, while eastbound traffic crosses the freeway on a curved, one-way overpass. Further west, westbound Washington Boulevard changes its name to Westmoreland Street, and eastbound Washington changes its name to Fairfax Drive. These one-way streets serve as a half-diamond I-66 interchange to the west, complementing the Sycamore interchange.

A map of the transportation facilities in the vicinity of the station is shown in Figure 2.

Figure 2: Schematic diagram of East Falls Church Metrorail station and vicinity

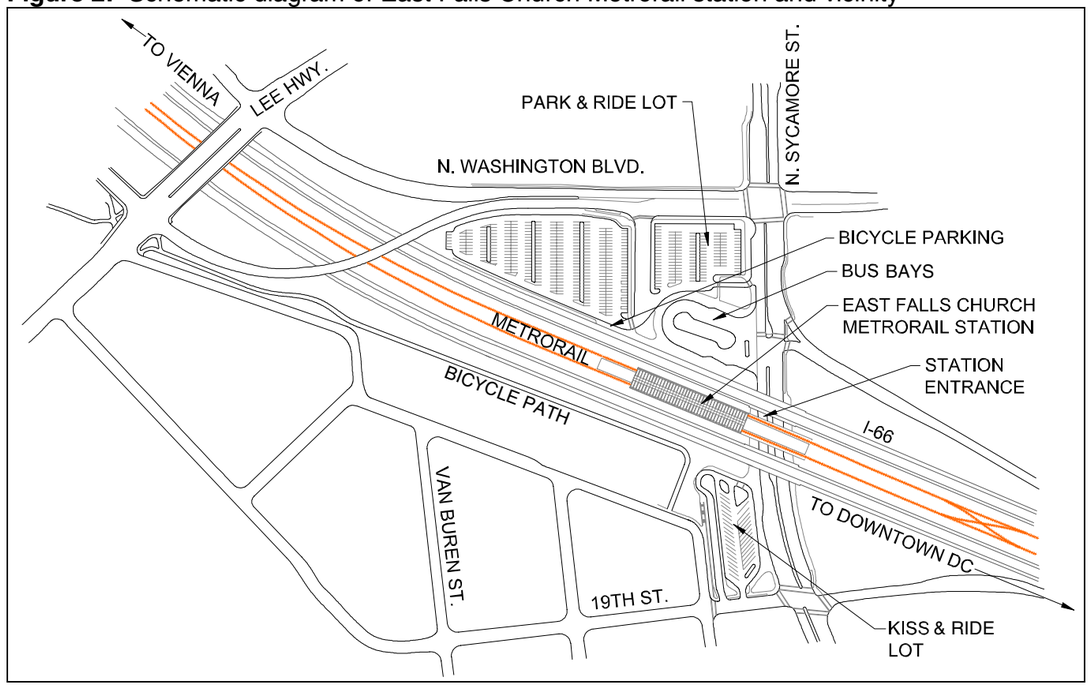
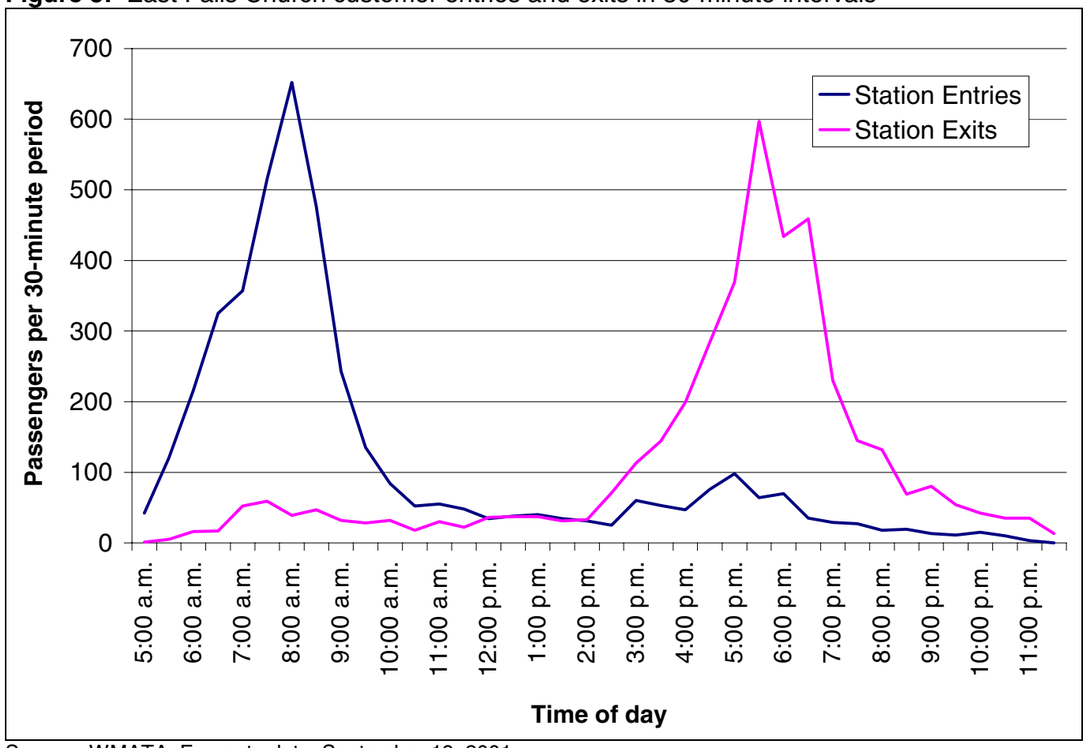


Figure 3: East Falls Church customer entries and exits in 30-minute intervals



Source: WMATA, Faregate data, September 19, 2001

The East Falls Church station averages about 4,100 customers per day, which means that about 4,100 customers enter the system at the station and about the same number exit the system at the station. Of the 83 stations in the Metrorail system, East Falls Church ranks 57th for daily ridership. Customer traffic is highly directional at East Falls Church, with large numbers of customers entering the station in the morning and large numbers exiting in the evening. Figure 3 shows customer entries and exits in half-hour intervals.

The station is a stop on five Metrobus routes that together account for 25 buses per hour during morning and afternoon peak periods, and nearly 300 buses per day. Buses serve the station from an appropriately sized bus transfer facility just north of the station entrance.

The station property also includes a kiss & ride lot south of the station with approximately 50 parking spaces, and a park & ride lot north of the station with approximately 425 spaces.

The size of the kiss & ride lot appears to be appropriate for its current usage. The lot rarely fills completely even during peak periods, and queuing is much less likely to be a problem than at other stations. However, demand for the park & ride lot exceeds the number of spaces available. The lot fills by 7:00 a.m. on a typical weekday, well before the peak hour of the adjacent roadway network.

North of Washington Boulevard, across the street from the park & ride lot entrance, lies a private parking lot known as the Palmer Lot. The lot has capacity for approximately 60 vehicles. Vehicles typically do not begin to use the Palmer Lot until the Metrorail park & ride lot fills.

Traffic and Pedestrian Studies

As part of the study, vehicle and pedestrian travel patterns were documented through several different types of studies.

Twenty-four hour directional volume traffic counts were conducted at the following locations:

- Washington Boulevard east of North Sycamore Street
- Washington Boulevard west of North Sycamore Street
- North Sycamore Street north of Washington Boulevard
- North Sycamore Street south of Washington Boulevard
- North Roosevelt Street south of 19th Street
- Van Buren Street south of 19th Street

Manual turning movement counts were conducted at the following intersections during morning and afternoon peak periods:

- North Sycamore Street and Washington Boulevard
- North Sycamore Street and 19th Street
- North Sycamore Street and the I-66 westbound off-ramp

Detailed capacity analysis was conducted at these three intersections, following procedures outlined in the *Highway Capacity Manual.* This analysis shows that traffic conditions at these intersections are fair during the morning peak period. The left-turn movement from northbound Sycamore Street to Washington Boulevard operates under constrained conditions.

The analysis also shows that afternoon peak-period traffic conditions are slightly better than those in the morning peak. In the afternoon, the heavy turning movement is a right turn from eastbound Washington Boulevard to Sycamore Street; the right turn does not contribute to congestion to the same degree as the congested morning-peak left turn.

The following counts of customers who reach the station using nonmotorized transportation were conducted during morning and afternoon peak periods:

- Pedestrians crossing at the intersection of North Sycamore Street and Washington Boulevard
- Pedestrians crossing at the intersection of North Sycamore Street and 19th Street
- Pedestrians entering and exiting the station from the west-side station access
- Bicycles and other users on the Washington and Old Dominion (W&OD) multi-use path where it crosses 19th Street.
- Bicycles locked in the immediate vicinity of the Metrorail station
- Customers transferring between Metrorail and Metrobus, taxis, and auto drop-offs, distinguishing mobility-impaired customers.

Figure 4: Survey card distributed to customers entering the station

ARLINGTON METRO STATION SURVEY

Please take a few moments to help plan for your transit needs by completing this survey and dropping it in any mailbox. No postage is required. Thank you.

A. How did you get to the Metrorail station where you received this card?

1 ☐ VRE
2 ☐ Walk
3 ☐ Shuttle bus
4 ☐ Bicycle
5 ☐ Tour bus
6 ☐ Taxi
7 ☐ ART bus
8 ☐ Metrobus (Route: _____)
9 ☐ Fairfax Connector (Route: ____)
10 ☐ Dropped off by someone
11 ☐ Drove a car and parked
12 ☐ Rode with someone who parked

B. What is the purpose of your Metrorail trip today?

1 ☐ Traveling to work
2 ☐ Traveling home from work
3 ☐ Job-related business
4 ☐ Shopping or meal
5 ☐ School
6 ☐ Personal trip
7 ☐ Sightseeing or recreation

C. Where did you start your trip to the Metrorail station today?

Address _____
OR Street & block no. _____
OR Nearest intersection _____
OR Building name _____

Customer Survey

In an effort to learn about customers' travel patterns, a customer survey was conducted at the East Falls Church station on September 19, 2001. All customers entering the station that day from 6:30 to 8:30 a.m. and 4:00 to 6:00 p.m. were offered a survey card, which asked several questions about customers' trips to the station. The survey card is shown in Figure 4. The

Figure 5: Respondents' transportation modes. (Rounding may affect sums.)

Transportation Mode	Morning Peak		Evening Peak	
	Percent of respondents	Number of customers*	Percent of respondents	Number of customers*
Walk	36	1047	22	110
Shuttle Bus	3	87	2	12
Bicycle	3	77	5	25
Metrobus	15	446	20	98
Dropped off by someone	20	582	17	86
Drove and parked	22	640	29	147
Rode with someone who parked	1	19	0	0
No response	1	39	5	25
Total	**100**	**2946**	**100**	**503**

* Calculated by applying the survey results to the total number of customers entering the station during morning (5:30 to 9:30 a.m.) and evening (3:00 to 7:00 p.m.) peak periods.

Figure 6: Respondents' trip purposes. (Rounding may affect sums.)

Trip Purpose	Morning Peak		Evening Peak	
	Percent of respondents	Number of customers*	Percent of respondents	Number of customers*
Traveling to work	95	2801	15	74
Traveling home from work	0	0	37	184
School	1	29	15	74
Job-related business	1	29	5	25
Shopping or meal	0	0	7	37
Personal trip	2	48	15	74
Sightseeing or recreation	0	0	7	37
No response	1	19	0	0
Total	**100**	**2946**	**100**	**503**

* Calculated by applying the survey results to the total number of customers entering the station during morning (5:30 to 9:30 a.m.) and evening (3:00 to 7:00 p.m.) peak periods.

survey posed questions about mode of travel to the station, trip purpose, and origin of the trip to the station.

Customers exiting the station were not surveyed; it was assumed that customers entering the station during the morning peak would likely exit the station during the evening peak, and vice-versa.

Of customers who received survey cards in the morning, 304 filled out and returned the cards. This represents a 10 percent sample of the total morning peak station volume of 2,950 customers.

This response rate results in a confidence interval of 6 percentage points at the 95 percent confidence level. Based on the results of the survey, one can be 95 percent confident that the percentages from the morning survey are within 6 percentage points of their true values. This level of confidence is sufficient for analysis.

Of customers who received survey cards in the evening, only 41 filled out and returned the cards. Few customers enter the station during the evening peak period—about 560—but the response rate of 7 percent was lower than that of the morning peak.

Because of the lower customer volumes during the evening peak, the evening survey did not produce a high level of statistical confidence. At the 95 percent confidence level, the confidence interval is 15 percentage points. One can be 95 percent confident that the percentages from the evening survey are within 15 percentage points of their true values. Because of the low confidence level, the analysis was based on results from the morning peak survey. Evening peak survey results are shown for information purposes only.

Customer Patterns

The data collection efforts revealed numerous patterns about customers' trips to and from the station.

The first question on the survey asked customers about the mode of transportation they used to arrive at the station. In both the morning and evening periods, survey results indicated that four modes of travel—walking, driving and parking, being dropped off, and riding Metrobus—accounted for over 90 percent of respondents' trips. Other modes, such as carpooling and bicycling, produced negligible responses. Detailed results of this question are shown in Figure 5.

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Figure 7: Origins of morning-peak pedestrian trips to the East Falls Church station

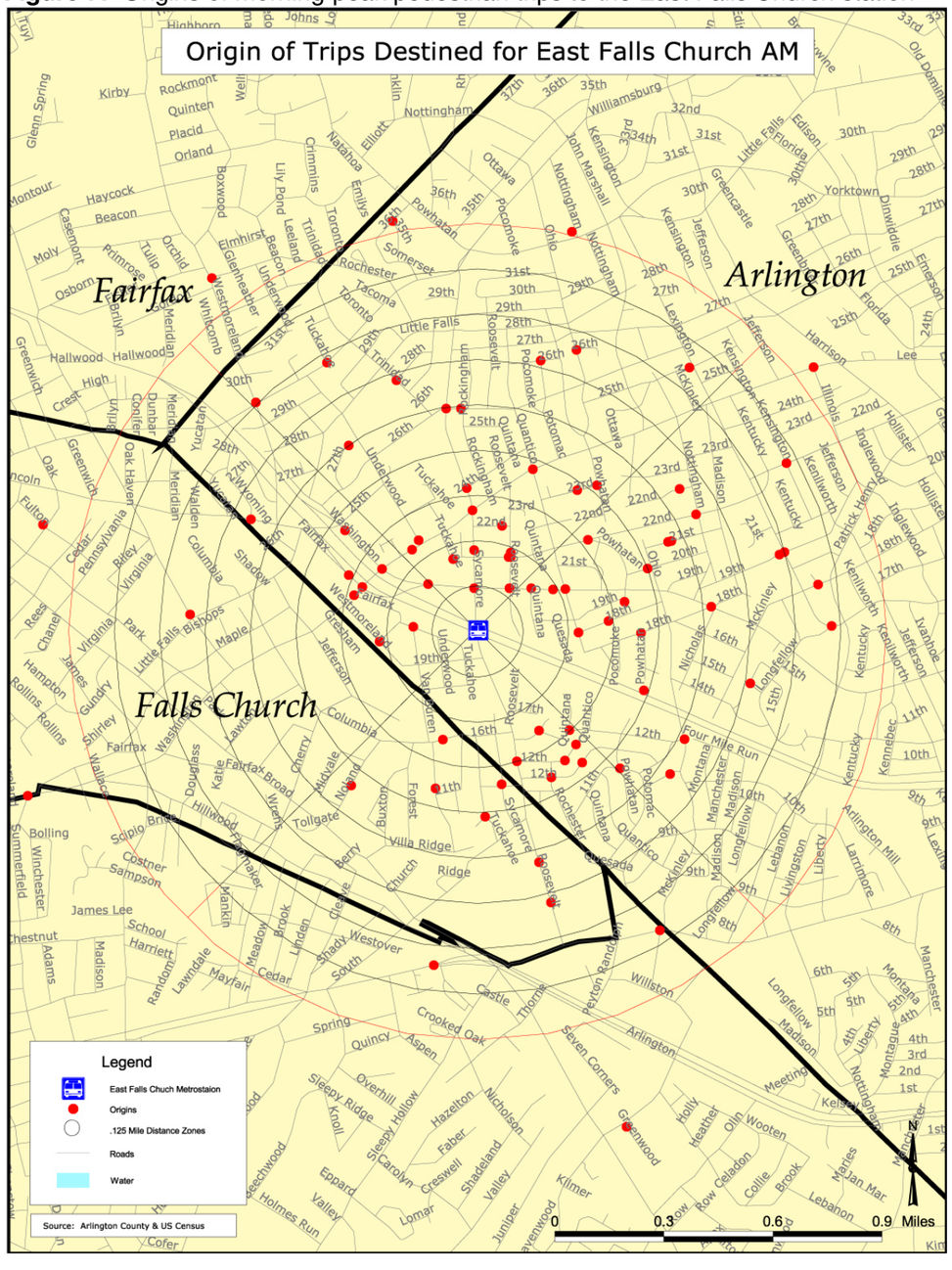

Figure 8: Origins of Morning Peak Walking Trips. Pedestrians whose morning-peak trips to the station originate from each of the zones shown in Figure 7. (Rounding may affect sums.)

Distance from station	*Percent of respondents*					*Number of customers**				
	North	*South*	*East*	*West*	*Total*	*North*	*South*	*East*	*West*	*Total*
0 to 1/8 mile	1	0	0	0	**1**	10	0	0	0	**10**
1/8 to 1/4 mile	7	0	2	3	**12**	71	0	20	30	**122**
1/4 to 3/8 mile	10	3	0	7	**19**	102	30	0	71	**203**
3/8 to 1/2 mile	6	8	6	2	**21**	61	82	61	20	**224**
1/2 to 5/8 mile	3	2	3	0	**8**	30	20	30	0	**82**
5/8 to 3/4 mile	2	5	5	1	**13**	20	51	51	10	**132**
3/4 to 7/8 mile	3	1	3	1	**8**	30	10	30	10	**82**
7/8 to 1 mile	4	2	3	0	**9**	41	20	30	0	**91**
1 to 1-1/8 miles	0	0	0	0	**0**	0	0	0	0	**0**
Over 1-1/8 miles	4	2	1	3	**10**	41	20	10	30	**102**
Total	**39**	**22**	**22**	**16**	**100**	**406**	**233**	**233**	**173**	**1047**

* Calculated by applying the survey results to the number of customers who walk to the station during the morning peak period (5:30 to 9:30 a.m.), as determined in Figure 4.

The second question on the survey asked about customers' trip purpose. Here, a clear differentiation exists between morning and evening periods. In the morning period, 95 percent of respondents were traveling to work, with other trip purposes garnering negligible responses. However, in the evening, trips were well distributed among several purposes, including trips both from work to home and home to work, personal trips, and trips to and from school. Figure 6 shows detailed results of this question.

Finally, the third question on the survey asked customers where they began their trips to the Metrorail station. Customers were given the option to respond with a specific street address, a street and block number, the nearest intersection, or a building name. Although results are available to this question from all respondents, respondents who walk to the station are particularly important for planning pedestrian improvements.

In the morning peak period, 103 respondents (36 percent) indicated that they walk to the station. Figure 7 shows in map form the origins of these pedestrian customers' trips to the station. The trips are summarized by distance and direction in Figure 8.

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Analyzing the results by distance shows that over 50 percent of pedestrians walk less than a half-mile to reach the Metrorail station, and that over 90 percent walk less than one mile. From a directional standpoint, the results show that the majority of customers arrive from the north of the station, and few customers arrive from the west of the station. Very few pedestrians arrive at the station from the southwest.

In the evening peak period, only eight survey respondents indicated that they walk to the station, too few for statistically significant judgments.

Park & Ride Patterns

On October 11, 2001, license plate numbers were collected from all vehicles in the park & ride lot, the long-term section of the kiss & ride lot, and the private Palmer Lot. These plate numbers were forwarded to the Virginia Department of Motor Vehicles (DMV), which provided the addresses of the registered owners of the vehicles. The addresses were grouped geographically to determine the origins of park & ride customers.

This technique cannot produce a perfect representation of trip origins, because vehicle trips do

Figure 9: Origins of park & ride trips to the station

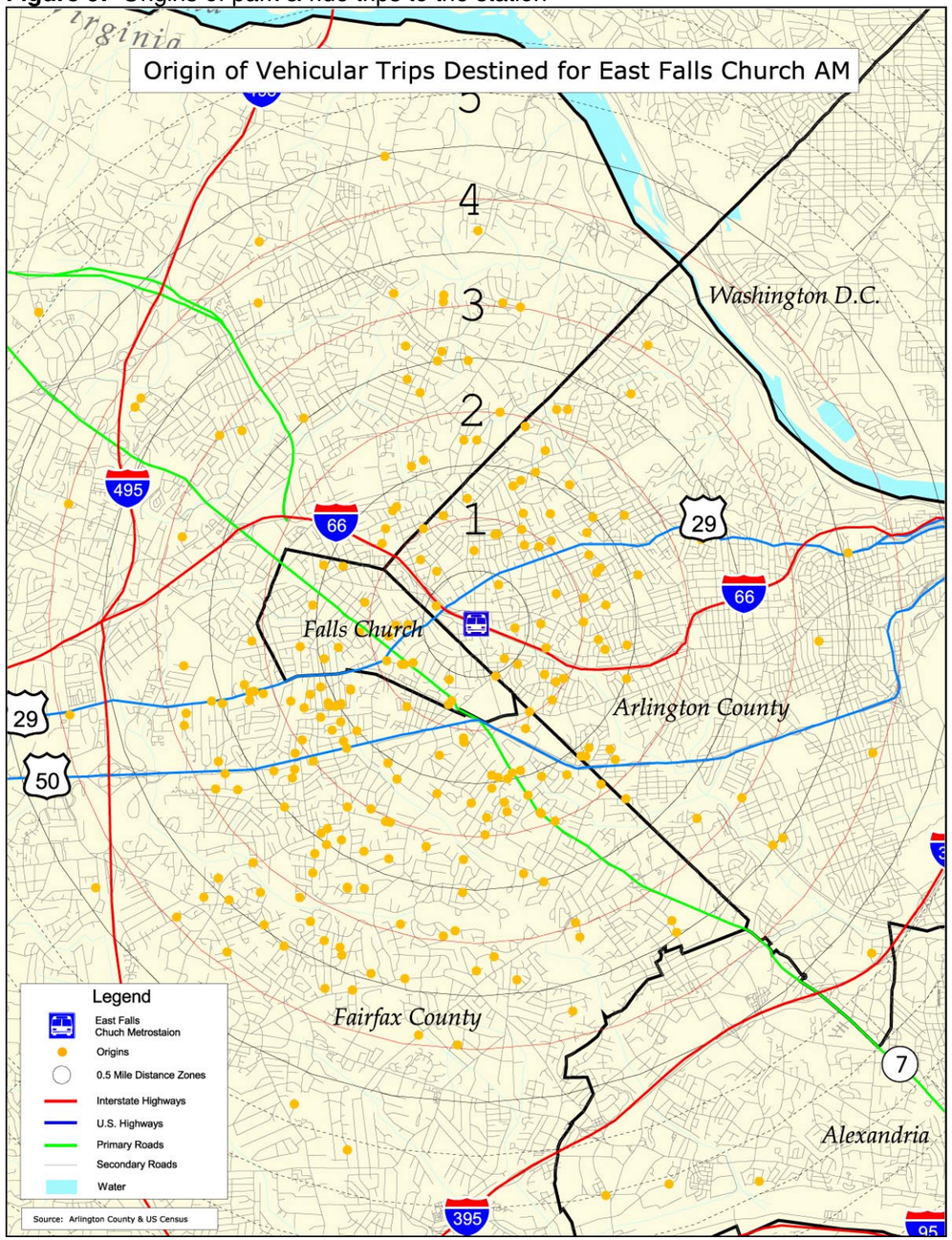

Figure 10: Origins of Park & Ride Trips. Park & ride customers whose trips to the station originate from zones shown in Figure 9. (Rounding may affect sums.)

Distance from station	Percent of responses by direction					Number of vehicles by direction*				
	North	South	East	West	Total	North	South	East	West	Total
0 to ½ mile	0	0	0	0	**1**	1	1	1	1	**6**
½ to 1 mile	2	1	3	3	**9**	12	7	15	13	**47**
1 to 1½ miles	4	4	4	3	**15**	18	19	22	16	**75**
1½ to 2 miles	2	6	1	6	**16**	12	29	7	32	**81**
2 to 2½ miles	2	4	0	4	**11**	9	21	1	22	**53**
2½ to 3 miles	1	4	1	3	**9**	7	18	3	16	**44**
3 to 3½ miles	2	5	1	0	**8**	9	25	6	1	**41**
3½ to 4 miles	1	2	1	2	**6**	3	12	4	10	**29**
4 to 4½ miles	1	0	0	0	**1**	3	0	1	1	**6**
4½ to 5 miles	0	1	1	0	**1**	0	3	3	0	**6**
Over 5 miles	2	5	0	16	**23**	9	23	1	79	**113**
Total	**16**	**32**	**13**	**39**	**100**	**82**	**158**	**66**	**194**	**500**

* Calculated by applying license-plate study results to parking capacity: 422 spaces in the park & ride lot, approximately 60 spaces in the Palmer Lot, and 15 spaces in the long-term section of the kiss & ride lot, rounded to a total of 500 spaces.

not necessarily begin from the address of the registered owner of a vehicle. However, this approach indicates the general distribution of parked vehicles.

Of the 409 license plates collected, the DMV was able to provide addresses for 350 registered owners, or 86 percent. Seven of these addresses were post-office boxes and were excluded from the analysis, which left 343 addresses for study. Figure 9 shows the geographic distribution of these addresses; Figure 10 shows the addresses grouped by distance and direction from the East Falls Church Metrorail station.

The park & ride facilities at East Falls Church primarily serve customers who live north, south and west of the station. Arlington residents comprise only 22 percent of park & ride customers. Customer distribution by jurisdiction is shown in Figure 11.

The results show a wide distribution in trip lengths for park & ride customers. Over 50 percent of customers drive less than 2½ miles to the station, but nearly 25 percent drive over 5 miles.

Most park & ride customers' trips begin north or south of the station. Since the Orange Line runs east-west in this area, customers far east or far west of East Falls Church can use a closer station. A few customers bypass a closer station to park at East Falls Church, perhaps because their trips include intermediate stops, such as picking up carpoolers or dropping off children at school or day care.

Most Orange Line customers travel eastbound in the morning, so it is not surprising that more park & ride customers come from west of the station than from east of the station. Park & ride customers coming from the east are backtracking—their trips may be shortened by using a station further east, such as Ballston.

Figure 11: Distribution of park & ride customers by ZIP code and jurisdiction. (Rounding may affect sums.)

		From ZIP code or area		*From jurisdiction*	
Jurisdiction	***ZIP code or area****	***Percent of vehicles***	***Number of vehicles*****	***Percent of vehicles***	***Number of vehicles*****
Arlington County	22205 (West Arlington)	8	38	22	112
	22207 (North Arlington)	8	39		
	22213 (Far west Arlington)	2	9		
	Elsewhere in Arlington	5	26		
City of Falls Church	22046	8	42	8	42
Fairfax County (including independent communities Fairfax City, Herndon, and Vienna)	22203 (Annandale area)	6	31	57	285
	22041 (Bailey's Crossroads area)	4	22		
	22042 (southeast of Falls Church)	19	96		
	22044 (southwest of Falls Church)	7	35		
	22101 (McLean area)	6	28		
	22043 (northwest of Falls Church)	2	12		
	Vienna, Fairfax areas	3	15		
	Tysons Corner, Great Falls areas	2	12		
	Reston, Herndon areas	4	20		
	Centreville, Chantilly, Clifton areas	1	7		
	Springfield, Burke areas	2	9		
Alexandria area		2	10	2	10
Loudoun County		6	28	6	28
Prince William County		1	3	1	3
Maryland suburbs		1	3	1	3
Outside Washington, D.C. metropolitan area		3	17	3	17
	Total	**100**	**500**	**100**	**500**

* Results are accurate for ZIP codes but approximate for jurisdictions. ZIP code boundaries do not always correspond with jurisdictional boundaries.

** Calculated by applying license-plate study results to parking capacity: 422 spaces in the park & ride lot, approximately 60 spaces in the Palmer Lot, and 15 spaces in the long-term section of the kiss & ride lot, rounded to a total of 500 spaces.

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Community Involvement

Meetings were held with residents surrounding the Metrorail station to allow the community to be involved in the planning process. A meeting was held on June 20, 2001 to solicit suggestions for station-area improvements from residents. On December 6, 2001, recommended station improvements were presented to residents and further comments were solicited.

Several suggestions for improvements were evaluated to determine whether they would be appropriate for implementation at the station. The evaluation showed that some suggestions would not have appreciably improved station accessibility. The more significant of these suggestions include the following:

- It was suggested to move the entrance to the kiss & ride lot from 19th Street to Sycamore Street, with the goal of reducing traffic impacts on 19th Street. This change would be infeasible. The distance between the proposed kiss & ride lot entrance and the existing 19th Street intersection would be far too short to allow effective operation of the traffic signals. Northbound and southbound left-turns would interlock, causing poor operation. In addition, there is a grade difference between Sycamore Street and the north end of the kiss & ride lot, with the difference increasing further north. This grade difference makes it infeasible to relocate the entrance to the north end of the kiss & ride lot, where the distance from the 19th Street intersection would be the greatest.

- It was suggested to switch the locations of the bus bays and the kiss & ride lot, again with the goal of reducing traffic impacts on 19th Street. Such a switch is technically feasible, but it does not appear that it would accomplish the desired goal. Bus traffic would likely be just as intrusive on 19th Street as kiss & ride traffic. The location of the lot would also make bus access more difficult, increasing the time most buses would need to access the station. The limited area would make it challenging to accommodate the large turning radii required by buses.

- The current location of the taxi stand is somewhat unorthodox. Taxis stand in the right turn pocket on southbound Sycamore Street approaching 19th Street. Consideration was given to relocating the taxi stand, but no superior location was found. In their current location, taxis do not interrupt traffic flow on Sycamore; other potential taxi stand locations would cause more traffic disruption or be less convenient for taxi patrons. The taxi stand formerly served as a Metrobus stop. The taxi stand only operates as effectively as it does because the bus stop was removed. If the bus stop were restored, additional consideration would need to be given to relocating the taxi stand.

Recommended Station Improvements

Elements numbered 1, 2, and 3 in Figure 12 are station improvements that are recommended to help improve customer access to the station. Each improvement is discussed in further detail below. Elements numbered 4 and 5 are possible changes to the station, discussed in a subsequent section.

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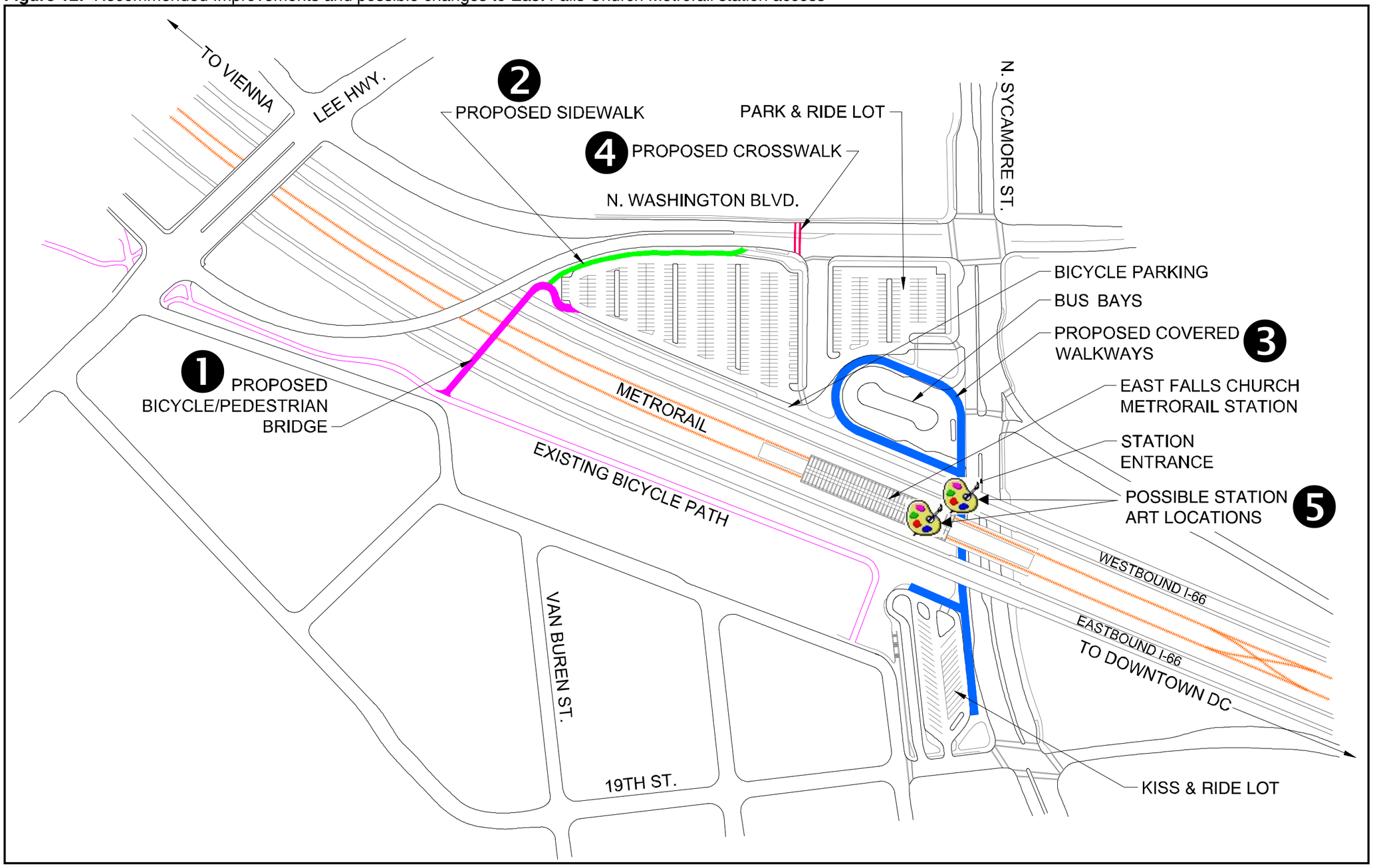
Figure 12: Recommended Improvements and possible changes to East Falls Church Metrorail station access



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❶ *Pedestrian/Bicycle Bridge Over I-66*

Accessibility to the station from the west is particularly poor. Few customers walk to the station from this direction, likely in part because of the lack of convenient walking routes. The W&OD multi-use path parallels I-66 west of the station, but it does not allow customers easy access to the station. Bicycle customers must ride on the path until it ends at Tuckahoe Street, then take 19th Street to Sycamore, cross under I-66 past the station entrance to the bicycle parking. This route takes bicycles through several intersections where they must interact with automobiles, past the station entrance where they must interact with pedestrian traffic, and either through or past the entrance to the kiss & ride lot where additional conflicts may arise. The bicycle lockers at the station are on the north side of the station, a further inconvenience to customers who use the lockers.

Pedestrian customers have a somewhat shorter route if they choose to use the stairs from Tuckahoe Street to the kiss & ride lot. Although this route is shorter, it is not accessible for disabled customers, and it does not alleviate interactions with kiss & ride traffic.

Bicycle traffic would be much better served by accessing the station from the north side; however, there are few opportunities for nonmotorized traffic to cross to the north side of I-66. The Washington Boulevard bridge over I-66 has no facilities for nonmotorized traffic. Sidewalks exist on both sides of the Lee Highway overpass, but bicycle traffic using that route would need to ride on the north side of Washington Boulevard, against traffic, to reach the station. Customers would still need to travel to Sycamore in order to cross Washington at a controlled location.

A bridge for nonmotorized traffic (Figure 13) just east of the Washington Boulevard bridge would allow a convenient connection between the W&OD path and the park & ride lot on the north side of the station. This would eliminate virtually all conflicts with pedestrian and vehicle traffic for customers approaching from the west.

An overpass would cause only minor losses of landscaping and parking in the park & ride lot.

The approximate cost of the bridge and approach ramps is detailed in Figure 14.

For customers approaching the station from the west, the bridge would shorten walking distance by about 100 feet, likely not enough to attract new customers solely on the basis of decreased walking distance. However, the bridge may attract new customers because it would create a better-quality path. The bridge would eliminate interactions with motor vehicles and eliminate the need to use the stairs on the west side of the kiss & ride lot. The bridge would reduce the length of the disabled-accessible walking path by about 600 feet.

Figure 13: Proposed pedestrian/bicycle bridge over I-66

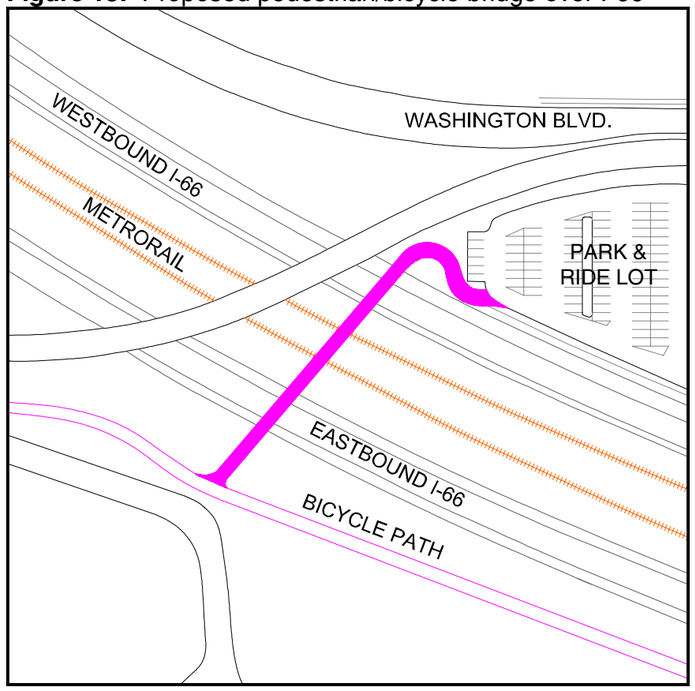


Figure 14: Cost estimate for pedestrian/bicycle bridge over I-66

Element	*Details*	*Approximate Cost*
Bridge structure	300 ft long x 15 ft wide x $150 per sq. ft.	$675,000
Approach ramps	100 ft long x 15 ft wide x $100 per sq. ft.	$150,000
Contingency, market allowance, design, construction management, agency costs		$825,000
Total Cost		**$1,650,000**

❷ *Washington Boulevard Sidewalk Connection*

The utility of a new overpass could be increased with a connection to the existing sidewalk on the south side of Washington Boulevard, which currently ends just west of the entrance to the park & ride lot. The connection (Figure 15) would not be a direct benefit to station access, because customers coming from the west would be able to enter the station most conveniently by using the existing sidewalk on the south side of the park & ride lot. However, for community accessibility, a sidewalk connection at this location may be logical.

This connection would be much more difficult to construct than a typical sidewalk. There is a significant grade difference between the park & ride lot and Washington Boulevard, and the sidewalk's profile would need to gradually transition between the two grades. Considerable use of structures such as retaining walls would be necessary. The trees on the north side of the park & ride lot would need to be removed, and minor losses in parking may occur in the park & ride lot.

The approximate cost of the sidewalk connection is shown in Figure 16.

The sidewalk would be difficult to justify solely on the basis of Metrorail station access. Customers would not need to use it enroute to the station, so it would be unlikely to attract new customers to Metrorail. The expense would need to be justified from a community accessibility standpoint, as it would encourage pedestrian and bicycle connectivity in the general vicinity of the station.

Figure 15: Proposed Washington Boulevard sidewalk

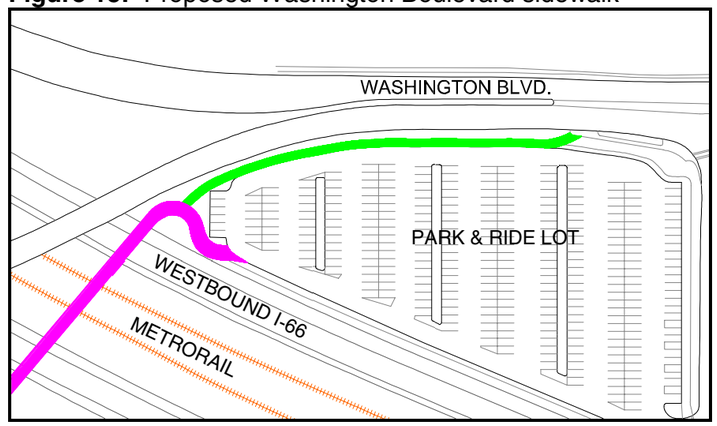


Figure 16: Cost estimate for Washington Boulevard sidewalk connection

Element	*Details*	*Approximate Cost*
Sidewalk	400 ft long x 5 ft wide x $5 per sq. ft.	$10,000
Retaining wall		$100,000
Contingency, market allowance, design, construction management, agency costs		$110,000
Total Cost		**$220,000**

❸ *Covered Walkways*

Customers walking between various parts of the station property currently do so on sidewalks largely exposed to the elements. A few waiting shelters are available for the use of bus and kiss & ride customers; however, many more customers use the station than can be accommodated by the shelters during inclement weather.

New covered walkways (Figure 17) could encircle the bus bays, providing sheltered access to the station for all bus customers. A covered walkway could also extend south of the station for the use of kiss & ride customers, and it could continue as far south as the taxi stand.

Approximate costs for the covered walkways are shown in Figure 18.

All customers who enter or exit at the East Falls Church station would traverse some portion of the covered walkways, since all customers use the Sycamore Street sidewalk to access the station entrance. Current ridership levels are approximately 1 million entering customers per year and an additional 1 million exiting customers per year. Over the approximate 20-year lifespan of the covered walkways, if ridership levels remain constant, about 40 million customers would enter or exit the station. Historic climate trends suggest that precipitation occurs during about ten percent of trips, and that shade would be beneficial for about another five percent of trips. Thus, considering customers using all transportation modes, about 6 million customers would benefit from the covered walkways.

Customers using kiss & ride and buses would derive even more benefit from the covered walkways, because the walkways could protect these customers from inclement or hot weather for longer periods of time and for nearly their entire walking distance. Approximately 20 percent of customers use kiss & ride, 15 percent use Metrobus, and three percent use shuttle bus during the morning peak hour. If these levels were consistent throughout the day, and if they were constant over 20 years, then approximately 2 million customers would derive this larger benefit.

The covered walkways are shown extending across the bus bay entrance, providing additional protection to customers north of the station. This location could also present an opportunity for an artistic gateway feature.

Figure 17: Proposed covered walkways

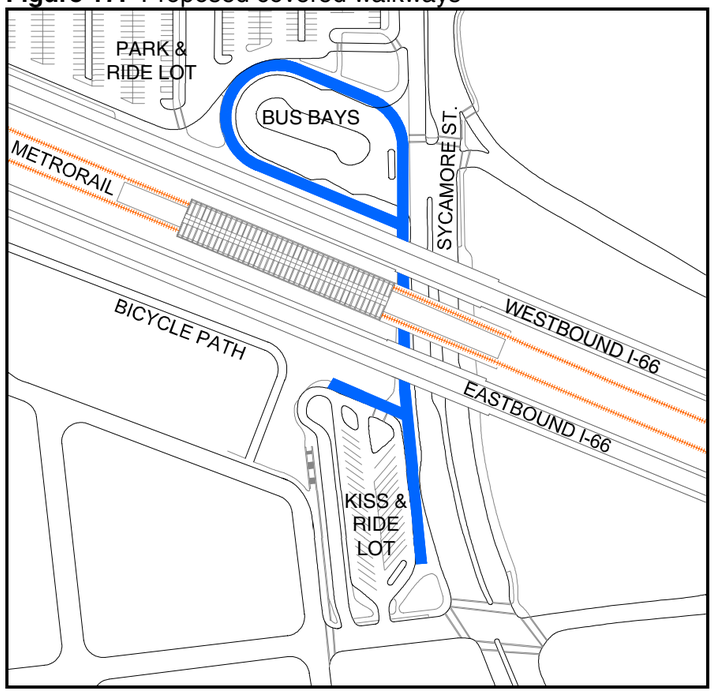


Figure 18: Cost estimate for covered walkways

Element	*Details*	*Approximate Cost*
Covered walkways	1250 ft long x 15 ft wide x $80 per sq. ft.	$1,500,000
Contingency, market allowance, design, construction management, agency costs		$1,500,000
Total Cost		**$3,000,000**

Possible Changes

In addition to the recommended improvements discussed above, the following changes could be considered.

4 *Washington Boulevard Crosswalk*

Pedestrian customers approaching the station from the northwest walk eastbound along the north side of Washington Boulevard. Some customers choose to walk as far east as Sycamore Street to cross Washington at a traffic signal. Others choose to cross Washington midblock and walk through the park & ride lot to reach the station entrance. The midblock crossing shortens the route slightly, but the crossing is not ideal because the rolling profile of Washington severely limits sight distance for pedestrians and drivers.

A member of the community suggested that a signalized crosswalk (Figure 19) just west of the park & ride lot entrance would make this shorter route more attractive to pedestrians. It would allow all pedestrians, including those who do not feel comfortable crossing midblock, to take advantage of the shorter route to the station. It would promote safety for pedestrians who currently cross midblock because the signal would give motorists a clear view of the crossing.

The crosswalk is considered a possible change, as opposed to a recommended improvement, because it has several drawbacks that offset its benefits.

Protecting the crossing with a traffic signal would require signalizing the intersection of the park & ride lot with Washington Boulevard. This would help drivers make safer left turns into and out of the park & ride lot, but it would not benefit other automobile traffic. No matter how well timed, a new signal would impede traffic flow on Washington, where traffic is already congested during peak hours.

Some pedestrians choose to disregard traffic signal indications, especially if they believe they can cross safely on their own. As such, some pedestrians may not wait for a green signal indication to cross if a signal were installed.

Pedestrians who currently cross midblock frequently use a median refuge island west of the proposed crossing. A new median island could be incorporated into the crossing, but a new island may require an undesirable shortening of the eastbound left-turn pocket approaching the Sycamore intersection.

A crosswalk would invite pedestrians to enter the park & ride lot at the same point as vehicles, but the lot does not have a provision for pedestrian traffic at this location. The existing lot entrance is not wide enough to accommodate a sidewalk along with the three existing vehicle lanes. Consideration could be given to eliminating one lane to provide additional pedestrian access.

Approximate costs for the crosswalk are shown in Figure 20.

If customers were to divert their routes and use the proposed crosswalk instead of the Sycamore crosswalk, their routes would be shortened by about 100 feet, with no significant changes in vehicle conflicts. This change in route characteristics is likely not enough to attract new customers to Metrorail. Thus, the crosswalk would need to be justified by evaluating its advantages and disadvantages in a larger context.

Figure 19: Proposed Washington Boulevard Crosswalk

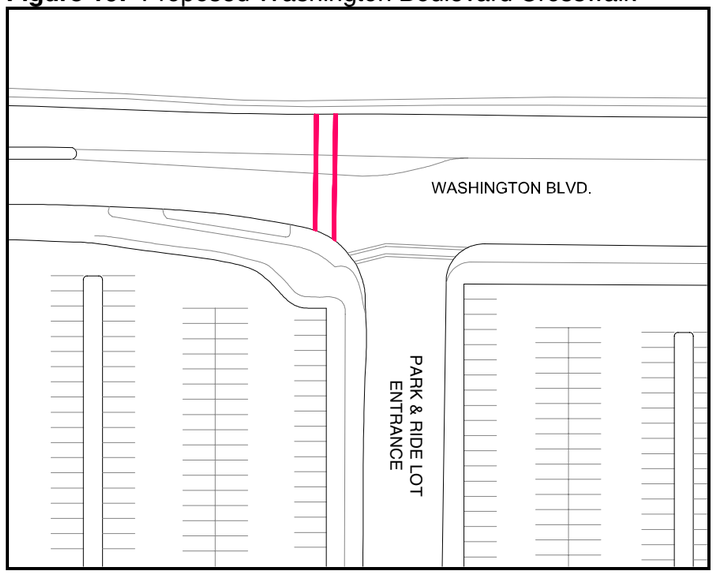


Figure 20: Cost estimate for covered walkways

Element	*Details*	*Approximate Cost*
Crosswalk	Signing, marking	$5,000
Traffic signal		$100,000
Contingency, market allowance, design, construction management, agency costs		$105,000
Total Cost		**$210,000**

5 *Station Art*

There is now no artwork in the station. A comment in the public review of the potential station improvements suggested that artwork, either within the station or on the site, could improve the station's appearance and create aesthetic and thematic linkages to the community.

A preliminary WMATA site review identified the following areas suitable for artwork in the non-paid areas of the station:

- The large exterior wall to the north of the station entry gates (Figure 21) is suitable for a mosaic or porcelain-enamel mural.
- The two skylight wells in the ticket area (Figure 22) are suitable for hanging sculptures or mobiles.

Artwork at these locations would be expected to range in cost from $85,000 to $110,000. Identifying a funding source would be necessary, as there is no source for funding artwork at existing Metrorail stations in Arlington County.

WMATA's Arts in Transit Program works with communities, arts professionals, jurisdictional arts councils, and the WMATA Board to select artwork for the Metrorail system. If funding is identified for artwork at the station, Arts in Transit will manage and facilitate a project to select artwork that best represents the community's cultural, historic, and artistic interests.

Figure 21: Wall north of station entry

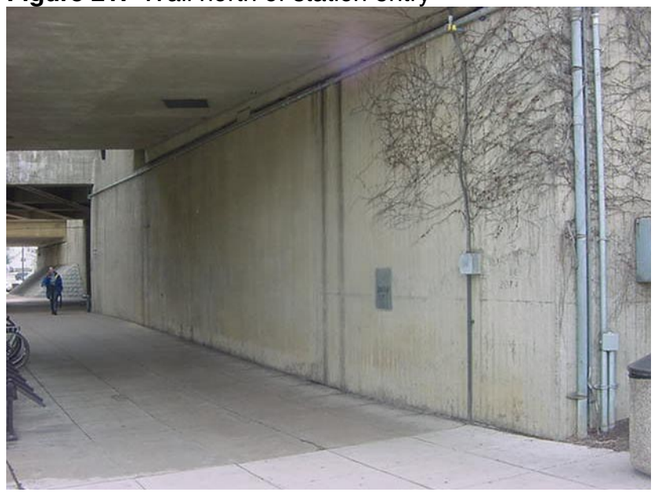


Figure 22: Skylight wells

Traffic Effects of Station-Area Development

Land close to Metrorail stations is among the most appropriate for higher-density development. Residents in the area around the East Falls Church station have discussed the potential for development there and requested that this study consider that possibility. However, no changes to Arlington County's General Land Use Plan (GLUP) have been proposed.

The lack of high-density development is a significant characteristic of the immediate vicinity of the East Falls Church station. Stations further east on the Orange Line generally are surrounded by medium- or high-density development; the East Falls Church area has a much different atmosphere because of its low density.

Development scenarios were based on the following three parcels:

- The kiss & ride lot, a 1.2-acre parcel just south of the station entrance
- The park & ride lot, a 3.7-acre parcel north of the station
- The Palmer parcel, which includes the existing Palmer lot and several adjacent residential structures. Total area of this parcel is 1.4 acres.

This study includes an analysis of the effects on traffic of potential development on these three parcels. Traffic is only one of many factors that must be addressed in the consideration of station-area development. The purpose of this analysis is to provide information to assist that consideration, not to make a recommendation for or against development.

If development were to occur on the WMATA-owned park & ride or kiss & ride lots, the development would need to retain the function of these lots, according to WMATA Joint Development Policy. For instance, if the kiss & ride lot were developed with residential land use, the kiss & ride function must continue to be accommodated, perhaps on the same site by integrating it with the development site plan.

Development Scenarios

Four development scenarios were defined for analysis. They incorporate different combinations of land uses at the three parcels under consideration. These scenarios are not intended to represent all potential development possibilities, but merely to provide representative examples to illustrate the effects of various types and densities of development.

- *Residential*. This scenario features residential development of 16 dwelling units per acre on the three parcels. Arlington County's General Land Use Plan (GLUP) considers this density as the minimum for low/medium residential development. This density is consistent with townhouse development as currently exists in the neighborhood northwest of the station.

- *Residential/Retail.* This scenario includes residential development of 36 dwelling units per acre on the three parcels. Arlington County's GLUP considers this density as the maximum for low/medium residential development, and it would be consistent with garden apartments in three- to four-story structures. This scenario also includes approximately 5,000 square feet of retail development on each parcel, a typical figure in Arlington County.

- *Office/Retail.* This scenario assumes office and retail development on the park & ride parcel with a floor-to-area ratio (FAR) of 1.5. Arlington County's GLUP considers this as the maximum FAR for low-density office development, and typically would result in office buildings of two to four floors. Office use was assumed to account for 93 percent of the development, while retail use was assumed to account for the remaining seven percent. This split is consistent with similar developments profiled in the County's *Development in the Metro Corridors 2000* report. This scenario was assumed to include no development on either the kiss & ride or the Palmer parcels.

- *Retail Center.* This scenario includes retail development on both the park & ride and Palmer parcels with an FAR of 1.0. Arlington County's GLUP considers this density as midrange for retail use. A similar retail center is Market Common, a 220,000 square-foot facility in Clarendon. This scenario would include no development on the kiss & ride parcel.

The scenarios are summarized in Figure 23.

Figure 23: Summary of development scenarios by parcel

Development Scenario	*Development on park & ride parcel*	*Development on kiss & ride parcel*	*Development on Palmer parcel*	*Total of all parcels*
Residential	• 59 dwelling units	• 20 dwelling units	• 22 dwelling units	• 101 dwelling units
Residential/Retail	• 133 dwelling units • 5,000 square ft. retail	• 45 dwelling units • 5,000 square ft. retail	• 50 dwelling units • 5,000 square ft. retail	• 228 dwelling units • 15,000 square ft. retail
Office/Retail	• 225,000 square ft. office • 17,000 square ft. retail	No development	No development	• 225,000 square ft. office • 17,000 square ft. retail
Retail Center	• 161,000 square ft. retail	No development	• 61,000 square ft. retail	• 222,000 square ft. retail

The park & ride lot's current capacity does not serve all the demand for parking at the station. As part of the analysis of development scenarios, an expansion of park & ride capacity was considered. An expansion of park & ride capacity from 422 spaces to 1,000 spaces was assumed for this analysis, although smaller or larger expansions would also be possible.

Peak-Hour Analysis

Traffic conditions were analyzed during the one hour of the morning and the one hour of the evening when traffic volume is heaviest. Traffic studies showed that the morning peak hour occurred between 7:30 and 8:30 a.m. and the evening peak hour occurred between 5:30 and 6:30 p.m.

Conditions at the following four intersections were analyzed:
- Sycamore Street and Washington Boulevard
- Sycamore Street and I-66 exit ramp
- Sycamore Street and 19th Street/I-66 entrance ramp
- Washington Boulevard and park & ride lot entrance

The analysis of the development scenarios was conducted using Synchro and SimTraffic simulation modeling software. These two software programs collectively form a state-of-the-art traffic evaluation package for a network of intersections. Synchro implements the methods of Chapter 16 of the 2000 *Highway Capacity Manual* and SimTraffic implements the vehicle and driver performance characteristics developed for use in traffic modeling through research by the Federal Highway Administration.

The models were first applied to existing traffic and roadway characteristics to ensure that they could represent present traffic conditions. The result was then used as a baseline against which to compare other scenarios.

Traffic Volume Forecast for Development

Traffic volumes were forecast for each scenario. First, existing traffic volumes were increased by ten percent to account for regional growth that will likely occur in the next three to five years. This growth rate is in accordance with historical trends from the Virginia Department of Transportation (VDOT). Traffic generated by the development in the various scenarios was then added to these increased volumes.

Site-specific traffic volume depends on the size and use of the development. For the residential scenarios, the size of the development is measured by the number of dwelling units. For the office and retail scenarios, the size of the development is measured in square feet.

The number of trips a given development will generate were estimated using *Trip Generation*, 6th Edition, published by the Institute of Transportation Engineers in 1997. The average number of vehicle trips generated by each site was calculated for morning and evening peak hours.

Since the East Falls Church Metrorail station is immediately adjacent to the site, transit customers would account for a large fraction of the total trips. The fraction of trips that would use transit was estimated using *Development-Related Ridership Survey II*, a 1989 WMATA report, to be as follows:

- 20 percent for office use
- 60 percent for residential use
- 45 percent for retail use

The total vehicle trips for the development scenarios were computed by subtracting transit trips from the total trips computed using *Trip Generation*.

New vehicle trips were then dispersed through the roadway network. Existing traffic patterns were extrapolated to estimate the routes that new vehicles would follow through the study area. Each intersection's final traffic volume was adjusted to account for the new trips that pass through it in each of the development scenarios.

Traffic Volume Forecast for Park & Ride Expansion

The additional traffic attracted by an expanded park & ride lot was also forecasted. During the morning peak hour, the existing park & ride lot is usually full well before the morning peak hour begins at 7:30 a.m., so the existing lot generates very few trips during the morning peak hour. However, the expanded lot would fill later than the existing lot, so traffic would be more likely to enter the lot during the morning peak hour. It was assumed that 30 percent of the lot would fill during the morning peak hour, and that these vehicles would arrive according to existing peak-hour traffic patterns.

During the evening peak hour, vehicles leaving the expanded park & ride lot were assumed to depart according to existing traffic patterns.

Analysis Assumptions

The following assumptions were made in the coding of the models:

- For each development scenario, the traffic signal system was optimized to minimize delay using a Synchro algorithm.

- In accordance with *Trip Generation*, retail-oriented developments attract a portion of their trips from traffic passing the site on the way from an origin to an ultimate destination. These retail trips may not add new traffic to the adjacent street system. Therefore, a 25 percent pass-by reduction factor was utilized in the evening peak retail scenario to account for this effect.

- The intersection of Washington Boulevard and the park & ride lot is currently unsignalized, but it would operate with less delay with a traffic signal in some of the development scenarios. In those cases, a traffic signal was assumed.

Measures of Effectiveness

The model provides several measures of traffic operational effectiveness that were compared to determine the relative impact of each scenario. Two primary measures of effectiveness are included in the report:

- *Total Network Delay:* a measure of the cumulative delay experienced by all vehicles traversing the study area during the peak hour.
- *Intersection Operation:* a measure of the level of congestion at intersections. Figure 24 shows the three operational levels used to evaluate each intersection.

Figure 24: Definition of intersection operational levels

	Good conditions. Most vehicles pass through intersection without waiting for more than one change of the traffic signal.
	Fair conditions. Some vehicles must wait for more than one change of the traffic signal.
	Poor conditions. Traffic is very congested. Most vehicles wait more than one change of the traffic signal.

Results of Traffic Simulation for Development Scenarios

Figure 25 shows results of morning peak-hour analysis for development scenarios, assuming no increase in park & ride lot capacity. In the morning peak hour, retail and residential land uses do not significantly aggravate traffic conditions. Retail facilities often do not open until after the peak hour ends at 8:30 a.m.; residential land uses take extensive advantage of transit. But office land uses cause significant impacts on traffic, as employees arrive by car during the morning peak. The traffic impacts of the Office/Retail scenario would be severe and would warrant further study of roadway improvements.

No intersection would operate under poor conditions except in the Office/Retail scenario. Traffic movements prone to failure include the northbound left turn from Sycamore Street to 19th Street in the Office/Retail scenario, and the southbound left turn from Sycamore Street to Washington Boulevard in the Retail scenario.

The Residential, Residential/Retail, and Retail Center scenarios would have delays about 30 percent higher than existing conditions. However, the Office/Retail scenario would have delays over 90 percent higher than existing conditions. An increase in delay of 30 percent translates to slightly longer average vehicle travel times; an increase of 90 percent translates to nearly doubling average vehicle travel times.

Figure 26 shows results of evening peak-hour analysis for development scenarios. Retail land use greatly affects traffic during the evening peak hour, as drivers returning home from work tend to visit retail establishments on their way home. The traffic impacts of the retail scenario would be severe, warranting further study of roadway improvements.

The Retail scenario would suffer from three poorly operating intersections due to heavy traffic demand backing up through the network; in total, six traffic movements would fail in the Retail scenario. In the Office/Retail scenario, the northbound left turn from Sycamore Street to Washington Boulevard would operate under failing conditions.

The network delays for the Residential, Residential/Retail, and Office/Retail scenarios would be from 40 to 50 percent higher than existing conditions. However, network delay for the Retail scenario would be nearly 250 percent higher than existing conditions.

Results of Traffic Simulation for Expanded Park & Ride Lot Capacity

Results of morning-peak hour simulation of the expanded park & ride lot with no development are shown in Figure 27. All three intersections along Sycamore Street would operate poorly with the expanded park & ride lot. Network delay would increase nearly 200 percent with the park & ride lot expansion in the morning peak, a bigger increase than would be caused by any of the development scenarios alone.

Figure 25: Results of morning peak-hour simulation of development scenarios with existing-size park & ride lot

Development scenario	*Intersection operation*				*Total network delay*	*Change in total network delay over existing conditions*	*Overall network operation*
	Sycamore St. & 19th St.	*Sycamore St. & Bus Entrance*	*Sycamore St. & Washington Blvd.*	*Washington Blvd. & Park & ride lot*			
Existing	■	▲	▲	■		baseline	▲
Residential	■	▲	▲	■		+ 29%	▲
Residential/Retail	■	▲	▲	■		+ 31%	▲
Office/Retail	▲	⬢	⬢	■		+ 92%	⬢
Retail Center	■	▲	▲	■		+ 29%	▲

Figure 26: Results of evening peak-hour simulation of development scenarios with existing-size park & ride lot

Development scenario	*Intersection operation*				*Total network delay*	*Change in total network delay over existing conditions*	*Overall network operation*
	Sycamore St. & 19th St.	*Sycamore St. & Bus Entrance*	*Sycamore St. & Washington Blvd.*	*Washington Blvd. & Park & ride lot*			
Existing	■	■	▲	■		baseline	■
Residential	▲	■	⬢	■		+ 41%	▲
Residential/Retail	▲	■	⬢	■		+ 46%	▲
Office/Retail	▲	■	⬢	■		+ 51%	▲
Retail Center	▲	⬢	⬢	⬢		+ 242%	⬢

The expanded park & ride lot would cause severe impacts to traffic conditions even with no development; as such, development scenarios were not considered in combination with the expanded park & ride lot.

Results of the evening peak-hour simulation are shown in Figure 28. No intersections would operate well, and a total of three traffic movements would fail. Network delay would increase by 80 percent with the park & ride lot expansion, more than for any development scenario except the Retail scenario. Again, the severe increase in traffic congestion precluded analysis of development together with park & ride lot expansion.

Traffic volumes used during the simulation of the park & ride lot expansion are shown in Figure 29, for morning and evening peak hours at the intersection of Washington Boulevard and the park & ride lot entrance.

Conclusions from Traffic Simulation

For the existing-size park & ride lot, the Residential and Residential/Retail scenarios would be acceptable, based on traffic operational conditions, during both morning and evening peak hours. Traffic would operate poorly both in the Retail scenario during the evening peak hour and in the Office/Retail scenario during the morning peak hour.

Expanding the park & ride lot capacity to 1,000 parking spaces would worsen traffic conditions because more vehicles would arrive during the morning peak hour; network delay would increase by an unacceptable level even without development. The traffic impacts of the larger lot would be severe, warranting further study of roadway improvements. A smaller expansion of the lot could be considered, but would require careful analysis of traffic impacts.

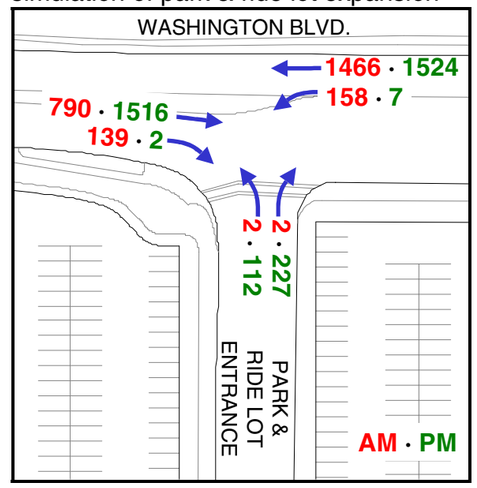
Figure 27: Results of morning peak-hour simulation of expanded park & ride lot

Park & ride lot size	*Intersection operation: Sycamore St. & 19th St.*	*Sycamore St. & Bus Entrance*	*Sycamore St. & Washington Blvd.*	*Washington Blvd. & Park & ride lot*	*Total network delay*	*Change in total network delay over existing conditions*	*Overall network operation*
Existing	■	▲	▲	■		baseline	▲
Expanded	●	●	●	■		**+ 189%**	●

Figure 28: Results of evening peak-hour simulation of expanded park & ride lot

Park & ride lot size	*Intersection operation: Sycamore St. & 19th St.*	*Sycamore St. & Bus Entrance*	*Sycamore St. & Washington Blvd.*	*Washington Blvd. & Park & ride lot*	*Total network delay*	*Change from existing conditions*	*Overall network operation*
Existing	■	■	▲	■		baseline	■
Expanded	▲	●	●	▲		**+ 79%**	●

Figure 29: Traffic volumes used in simulation of park & ride lot expansion



Parking Demand Forecast

Demand for parking at the station clearly exceeds current supply. The study examined the demand for parking at the station in both existing and future years. WMATA has used a standard methodology to estimate parking demand when considering parking structures at other stations. This same methodology has been applied to the East Falls Church Station.

Existing Parking Demand

WMATA estimated current parking demand by comparing existing parking accumulation patterns at the East Falls Church station with parking accumulation patterns at stations with an unconstrained supply of parking; that is, facilities that did not reach capacity on typical weekdays. The estimate suggests that existing demand for parking at the East Falls Church Station is in the range of 800 to 900 parking spaces, approximately twice the current supply of 422 spaces.

Future Parking Demand

WMATA estimated future parking demand by modeling current parking patterns against changes in land use, transit boarding patterns, and transit service. This estimate suggest that an additional 250 spaces will be needed at the East Falls Church station to accommodate demand by the year 2025. This estimate relies on the following transit service assumptions:

- Extension of the Metrorail Orange line from Vienna to Centreville
- Completion of a Metrorail line from West Falls Church to SR-772 in Loudoun County via the Dulles Corridor
- Completion of a Metrorail Purple line in Prince George's County from Branch Avenue to Eisenhower Avenue, and in Montgomery County from Rock Springs to Greenbelt
- Completion of Georgetown Branch light-rail transit from Bethesda to Silver Spring